

Appl.No. 09/990,965
Amdt. Dated May 30, 2006
Reply to Office Action of February 27, 2006

Remarks / Arguments

Claims 1, 4-9 and 12-16 are pending in this application. Claims 1, 4-9 and 12-16 stand rejected. Dependent claims 2, 3, 10 and 11 were cancelled by a previous amendment.

Entry of this response is appropriate since any amendments (a) place the application in condition for allowance; (b) do not raise any new issues requiring further search and/or consideration; (c) do not present any additional claims and (d) place the application in better form for appeal - should such appeal be necessary.

Entry of this response is therefore respectfully requested as the applicants believe that it narrows the issues considered and recasts the arguments so that any outstanding rejections are traversed and reconsideration is appropriate.

If, however, the Examiner believes that there are any unresolved issues requiring adverse action in any of the claims now pending in the application, it is requested that the Examiner telephone Jeffery J. Brosemer, Ph.D., ESQ. At 732-335-5773, so that arrangements may be made for resolving such issues as expeditiously as possible.

Claims Rejection – 35 U.S.C. §103(a)

The Examiner rejected Claims 1, 7-9, 15, and 16 under the provisions of 35 U.S.C. §103 (a) as being unpatentable over United States Patent No. 6,104,515 issued to Cao on August 15, 2000, (hereinafter the Cao '515 patent) in view of United States Patent Application Publication No. 2003/0002121 A1 by Miyamoto et al. (hereinafter the Miyamoto '121 Appl.).

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In outlining his rejection of claims 1 and 9, the Examiner stated that the Cao '515 patent teaches a transmitter comprising a means for generating a stream of optical pulses in which alternate of such pulses have essentially orthogonal polarizations, and a means for modulating the phases of said optical pulses as a function of input data to encode the input data onto the stream of optical pulses.

And while the Examiner correctly noted that the Cao '515 patent fails to disclose any RZ optical pulses, the Examiner nevertheless took official notice that using RZ format for optical pulses is well known in the art and that it would have been obvious for a skilled artisan at the time of the invention to have an RZ format for the optical pulses of Cao. Finally, the Examiner noted further that while the '515 patent does not disclose a DPSK modulation, he stated his belief that this deficiency in teaching is made up by the Miyamoto '121 Appl. disclosure of an optical transmission system wherein the binary optical pulses are phase modulated using a DPSK format.

As noted in prior communications, the optical transmitter claimed in the instant application comprises an RZ optical pulse generating means whereby adjacent ones of the generated pulses have essentially orthogonal polarizations. These orthogonally polarized pulses are subsequently modulated by an optical modulator means which modulates the phases of the optical pulses according to an input data stream such that the input data is encoded in the phases of the optical pulses in a DPSK encoding format.

In sharp contrast, the Cao '515 patent upon which the Examiner principally relies discloses – not an optical transmitter – rather a high order Polarization Mode Dispersion (PMD) compensation arrangement (10 - Fig.1) which would be implemented at a receiver site – and not a transmitter as taught and claimed by the applicants of the instant application. (See, e.g., Cao '515, Col. 4, Lines 58-60)

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According to the patentees, PMD compensation is achieved by temporal imaging of the polarization states of optical pulses received with a phase delay due to PMD. As taught therein, a clock recovery circuit 34 generates a sinusoidal output clock signal from a digital signal received at the PMD compensator 10, at the bit rate of the received input signal (See, e.g., Col. 4, Lines 52-56). An electrical driver 40 provides the recovered clock signal (amplified and phase shifted) to drive a phase modulator 26 (See, e.g., Col.5, lines 61-68)

Importantly, because the patentees apply a drive signal to the modulator which is nothing more than a recovered clock, the signal that emerges from their phase modulator 26, is merely a corrected input signal which is applied via optical link 23. That is to say, the signal emerging from the phase modulator is the same signal (albeit phase corrected) that is received by the phase modulator and does not have any additional data modulated onto it.

In sharp contrast, the invention of the present application applies an optical signal consisting of RZ optical pulses in which alternate ones of such pulses have essentially orthogonal polarizations to a modulator, and then modulates the phases of the applied signal as a function of an input data stream thereby encoding the input data onto the stream of RZ optical pulses.

Alternatively stated, the Cao '515 patentees correct the phase of a signal, while the applicants of the instant invention encode data onto a signal. Accordingly, it is unlikely that one skilled in the art would employ the teachings of the Cao '515 patent to encode data onto a signal as taught and claimed by the present applicants.

Of further importance, it is noted that the examiner is correct in observing that the Cao '515 patentees do mention optical pulses having orthogonal polarizations (14, 15). However, the optical pulses disclosed by the patentees are not generated orthogonally and then transmitted, rather they

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result from distortions caused by PMD which coincidentally may have orthogonal polarizations.

In sharp contrast, and according to the present invention, each data bit in the polarization bit-interleaved signal disclosed by the present applicants has a well-defined, characteristic polarization. There is simply no teaching in the Cao '515 patent of generating a stream of RZ optical pulses in which alternate ones of such pulses have essentially orthogonal polarizations, as taught and claimed by the instant applicants.

Since the Cao '515 patent cannot negate the patentability of the claims of the instant application, the only remaining question is whether the cited combination of the Cao '515 patent with the Miyamoto '121 Appl. overcomes the teaching deficiency. The answer is no.

In broadly applying the teachings of the Miyamoto '121 Appl. in conjunction with the Cao '515 patent to the claimed invention of the instant application, the Examiner relies on the general disclosure of a DPSK modulation scheme by the Miyamoto '121 applicants as providing sufficient motivation for its combination with the Cao '515 patent. Yet while the Miyamoto '121 Appl. does in fact employ a DPSK scheme, it actually teaches away from the present invention.

More particularly, it is again noted that the applicants of the instant application teach a transmitter system and method whereby a stream of RZ optical pulses in which alternate ones of said pulses have essentially orthogonal polarizations are subsequently phase modulated as a function of input data applied thereby encoding said input data onto the stream of RZ optical pulses. According to the present invention, it is these phase modulated signals which are subsequently transmitted.

In contrast, the Miyamoto '121 applicants take a phase modulated signal and convert that signal to an RZ intensity modulated signal prior to transmission. Consequently, the Miyamoto '121 applicants teach the

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transmission of a RZ intensity modulated signal, while the applicants of the instant application teach and claim an RZ phase modulated signal.

Given this teaching away from the present invention, the present applicants urge that the cited references, taken alone or in the combination suggested, do not render the invention claimed in independent claim 1 obvious.

Finally, The Examiner rejected claims 4, 5, 12, and 13 under the provisions of 35 U.S.C. §103 (a) as being unpatentable over the Cao '515 patent in view of the Miyamoto '121 Appl. further in view of the United States Patent Application Publication No. 2002/0003641 A1 by Hall et.al (hereinafter the Hall '641 Appl.) and rejected claims 6 and 14, in view of the combination of the Miyamoto '121 Appl., the Hall '641 Appl., further in view of United States Patent No. 4,881,790 issued to Mollenauer on November 21, 1989 (hereinafter the Mollenauer '790 patent).

While the addition of these references does generally teach certain techniques that are applicable to the present invention, they do not, either alone or in the combination suggested teach or suggest or make obvious – either explicitly or implicitly – the claimed transmitter / method of transmitting of the instant application.

In that regard, independent claim 1 now recites (with distinguishing limitations shown in bolded typeface):

1. A **transmitter for use in optical communication system, said transmitter comprising**
 - a means for **generating a stream of RZ optical pulses in which alternate ones of such pulses have essentially orthogonal polarizations, and**
 - a means for **modulating the phases of said optical pulses as a function of input data applied to said transmitter thereby**

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encoding said input data onto said stream of RZ optical pulses,

wherein said modulating means is a Differential Phase Shift Keying (DPSK) modulator. [emphasis supplied]

Since each of the additional independent claims 4, 7, 9, 12 and 15 of the present application recite similar distinguishing limitations which are not taught or suggested by the cited combination of references, the applicants believe that they are all allowable in their present form as well.

Inasmuch as each of the dependent claims 5, 6, 8, 13, 14, and 16 each recites further distinguishing limitations, the applicants submit that they too are allowable in view of the cited art.

Conclusion:

With these remarks, the applicants have made a concerted effort to further the prosecution of the application by outlining some of the distinguishing characteristics of the claimed invention in view of the cited art. As such, the applicants believe that all of the claims now in the application - in their present form - are in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,
JEFFERY J. BROSEMER

By 

Jeffery J. Brosemer

Reg. No. 36,096

Tel.:(732)335.5773